SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

REPORT
ON
PROPOSED IMPROVEMENTS
ON
SILVER CREEK DIVERSION

ZONE E-1

PROJECT NUMBER 40038

The engineering for this report was done by
Charles S. McCandless & Company
Consulting Engineers

TC
425
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1969
c.2

NOVEMBER 1969

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SANTA CLARA COUNTY FLOOD CONTROL
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NTA CLARA COUNTY
OOD CONTROL
ATER DISTRICT
516 EAST MARTHA STREET SAN JOSE, CALIFORNIA 95112
DONALD K. CURRLIN GENERAL MANAGER

October 28, 1969

Board of Directors
Santa Clara County Flood
Control and Water District
516 East Martha Street
San Jose, California 95112

Gentlemen:

Transmitted herewith is the Engineer's Report on Proposed Flood Control Improvements for Silver Creek Diversion Project Number 40038, in Zone E-1 (East) of Santa Clara County Flood Control and Water District.

The report describes a 9000 feet of proposed improvements consisting of enlarging the flow capacity of existing creek channel and constructing a diversion channel. The diversion channel improvements will include concrete lined channel section, box culverts and an energy dissipator, with the improvement of existing channel including concrete lined section, earth channel section, box culverts, and debris basins. The proposed improvements will prevent flood damage to the existing and projected urban development in the flood plain of Silver Creek.

The estimated cost of the proposed 9000 feet of improvements is $871,000.

I concur in the projects as proposed and recommend a public hearing be held as a prerequisite to the construction of the project.

Sincerely yours,

Donald K Currlin
General Manager

ENT OF ADMINISTRATION AND FINANCE 299-2031 CLERK OF THE BOARD 299-2031 ENGINEERING DEPT. 299-3841 PUBLIC SERVICE DEPT. 299-3841

INTRODUCTION

Silver Creek originates in the low foothills southeast of San Jose in the general vicinity of Metcalf Road at about elevation 1,200 feet. It flows north-northwesterly through the foothills and valley floor to a confluence with Coyote Creek near Bayshore Highway. Silver Creek watershed has a total of 30,590 acres. The Upper Silver Creek watershed is bounded on the west by the Coyote Creek watershed and on the east by the Thompson Creek watershed, a major tributary to lower Silver Creek. The Silver Creek watershed is located in the unincorporated territory and the City of San Jose.

Silver Creek channel is well defined until it emerges from the foothills and enters onto the valley floor. Areas adjacent to Silver Creek have experienced severe flooding under present conditions and these areas are rapidly urbanizing. Additional development in the watershed will increase the potential flood hazard; therefore flood control improvements must be undertaken. Alternative types and combinations of improvements have been studied to develop the most economical solution. The result of these studies indicates that all flows from the Upper Silver Creek watershed consisting of 3,590 acres should be diverted through an open channel to outfall into Coyote Creek near Singleton Avenue. This report presents in detail the results of these studies and consists of:

1. A general description of the watershed and the flood problems together with a map showing the location of the proposed improvements.
2. A discussion of the proposed project together with plates showing plans, profiles and rights-of-way.
3. An estimate of the cost of the proposed project and a suggested means of financing these costs.

DESCRIPTION OF WATERSHED

The Upper Silver Creek watershed is located in gradually sloping foothills and has a drainage area of 5.6 square miles. The portion of the Silver Creek watershed which is presently subject to flooding by flows from the upper watershed is the relatively flat valley floor. Until recently this flat area was used for a golf course, orchards, and a few homes. A number of subdivisions now exist on this flat area and others are planned. A major shopping center is planned in the previous location of the golf course. The major existing streets in this area are Silver Creek Road, King Road, Capitol Expressway, and Quimby Road.

Plate 2 is a map showing the Upper Silver Creek watershed and illustrating the general topography of the area. The basin has a mean annual precipitation of about 15 inches. The watershed is long and narrow, averaging about 5,000 feet wide and is about six miles in length.

The drainage area is located entirely within a northwest-southeast oriented ridge which projects into the floor of the Santa Clara Valley. Bedrock in the upper one-third of the watershed consists of variable amounts of sandstone, shale and serpentine with a residual soil of silt, silty clay and sandy clay containing rock fragments. In the lower two-thirds of the basin, similar bedrock and residual soil comprises the watershed west of the creek, with older alluvial deposits consisting of clay and clayey gravel forming the area of low relief east of the creek.

Although the topsoil locally is relatively permeable, runoff from bedrock and residual soil west of the creek is rapid with high erodability of the soil cover. In the alluvial soils east of the creek, and in the channel deposits of the creek itself, infiltration rate is moderate to rapid.

The native growth in the watershed is a fairly heavy cover of grass with some trees and shrubs in the canyons. This type of cover has a considerable effect in reducing runoff for low rainfall intensities but has little effect on the runoff from high intensity rainfall that produces the design flood flows.

In computing the flood flows for the design of the proposed flood control improvements, these characteristic factors of the watershed were considered.

DESIGN CRITERIA

The criteria used in the design of the Upper Silver Creek flood control improvements followed accepted engineering standards. Conservative values of roughness (representing the friction along the channel banks and bottom) were used in the hydraulic design to allow for some deterioration in channel smoothness with time.

Economic evaluations of alternative channel alignments and design cross-sections were based on estimated construction costs including engineering and inspection costs, right-of-way values, and the present worth of future maintenance costs.

Completed improvements will provide a level of protection to safely convey a one-percent design flood (the so-called 100-year recurrence frequency flood) to a point of disposal. The hydraulic design of the channel provides sufficient freeboard to convey the 80 percent upper limit confidence level of the design flow. The design flood flows meeting this standard for Silver Creek were computed using the results of a regional Flood Frequency Hydrologic Analysis. This multiple correlation analysis, based on data from gaged watersheds, was utilized to determine the peak flood flow in accordance with tributary area, mean annual precipitation, and basin shape. The resulting computed design flows are given in Table 1.

TABLE 1

Design Flood Flows

Reach	Station	Location	Watershed (1) Area in Acres	Peak Flow (2) In cfs	
				Design	Upper Limit
1 thru 7	0+87 to 90+88	From beginning of project (near Silver Creek Road) to outfall into Coyote Creek	3590	950	1550

(1) Silver Creek watershed at point of Diversion

(2) Upper limit is the expected flood flow at the 80 percent confidence level for the 100-year recurrence frequency event.

DESCRIPTION OF PROPOSED PROJECT

Approximately 20 percent of the design flood flow for Silver Creek rises from the upper five square miles of watershed and this flow must be conveyed about 16 miles through existing urbanized areas to the point of disposal in Coyote Creek. The downstream 3.6 mile reach of the channel has already received interim improvements. It was evident that any planning study should review a number of upstream alternative channel alignments including an upstream diversion which would allow the existing interim channel improvements to more nearly control the flow.

From this planning study it was determined that a diversion of flood flow from the Upper Silver Creek watershed, comprising 5.6 square miles, to the Coyote River in the vicinity of Singleton Road would provide the most economical overall project. Savings would be achieved by reducing the downstream flood flow sufficiently to allow utilization of portions of the interim existing improvments and by eliminating about 1.5 miles of creek channel immediately downstream of the point of diversion from the flood control project.

To eliminate the flooding hazard caused by the flood flows from Upper Silver Creek, the proposed diversion channel will originate near Silver Creek Road and will outfall into Coyote Creek near Singleton Avenue. These proposed improvements extend over a length of 9,000 feet and include concrete lined channel sections, earth channel sections, box culverts, energy dissipators and a debris basin. The proposed improvements are illustrated in plan and profile on Plates 3 through 6.

The proposed diversion will contain a baffle block energy dissipator at the confluence with Coyote Creek. Upstream from the dissipator a double 10.5 by 8.5 foot box culvert will convey the flow under Tuers Road. A transition section will extend from Tuers Road box culvert to Station 2+60. From station 2+30 to Station 36+43, a trapezoidal concrete lined section is proposed. This trapezoidal channel will be aligned with the adjacent property line from Tuers Road to approximately Station 25+00 and will then turn southerly and continue adjacent to the Bayshore Highway to about Station 36+43.

Continuing upstream, the proposed Bayshore Highway crossing will consist of a 12 by 9 foot reinforced concrete box culvert transition followed by a 108-inch reinforced concrete pipe under the Highway, and another 12 by 9 foot concrete box culvert transition on the east side of the Bayshore. This transition design is proposed to minimize the hydraulic losses in conveying the flow under the highway.

Upstream of the Bayshore Highway crossing, approximately Station 41+41 to Station 65+65, the trapezoidal concrete lined section is proposed again. The alignment generally follows the edge of the hill line and in some reaches centers on property lines to minimize severance cost.. Between Station 65+65 and Station 75+60, the alignment of the proposed trapezoidal concrete channel follows the existing creek. The proposed crossing for Silver Creek Road is a double 10 by 10 foot reinforced concrete box with drop inlet entrance into the culvert serving also as a shallow debris basin.

The reach upstream from Station 75+60 to Station 90+88 will be developed as a natural flood plain having a width of 115 feet with flat sloping sides and a maximum depth of six feet bounded by Silver Creek Road on the south bank and proposed city development (road or park) on the north bank. A trash rack is proposed for the upstream side of an existing culvert under Silver Creek Road in the natural waterway reach. The section shown on Plate 6 is the minimum flood control right-of-way required to convey the design flow and preserve the natural features of this reach.

Upstream of Station 90+88 the existing channel is of adequate size and slope to convey the design flood. No improvements are proposed other than maintenance work and, if necessary, construction of a debris basin. For hydraulic capacity and maintenance purposes the District will require a right-of-way equal to the existing channel width plus fifteen feet of setback at the top of each bank in accordance with District Ordinance 59-1.

The concrete lined open channel reaches of Silver Creek Diversion will be fenced. A five-foot wide area on each side of the trapezoidal channel has been shown for landscaping if either the City of the County desires to so implement it.

CONSTRUCTION STAGING

Silver Creek Diversion project is divided into two construction stages. Stage I would be from the proposed outfall into Coyote Creek to Station 65+64 which is at the point of diversion. Stage II would encompass the remainder of the project which would include enlarging the existing channel to a point where the natural stream channel is adequate in size to convey the flows.

PROJECT COST AND FINANCING

The estimate of the cost of construction of the proposed flood control improvements to Silver Creek Diversion was made using 1969 prices. A contingency item was estimated and also includes costs to account for the engineering, construction inspection, advertising, legal fees and other incidentals. The estimated costs are presented in Table 2.

TABLE 2

ESTIMATED COST OF PROJECT

Reach	Stage	Station Limits	Construction	Contingencies	Right-of-Way (1)	Total
1	1	0+87 to 2+60	$ 99,000	$ 24,400	$ 3,600	$127,000
2	1	2+60 to 12+00	79,000	19,800	40,200	139,000
3	1	12+00 to 36+43.65	109,000	27,200	46,800	183,000
4	1	36+43.65 to 41+41.36	125,000	31,100	2,900	159,000
5	1	41+41.36 to 65+65.28	92,000	23,000	45,000	160,000
6	2	65+64.28 to 75+60	47,000	11,400	19,600	78,000
7	2	75+60 to 90+88	20,000	5,000	-----	25,000
TOTALS			$571,000	$141,900	$158,100	$871,000

(1) The right-of-way cost for the planter areas is not included.

The current assessed valuation of the East Zone will provide the source of funds from ad valorem taxes to finance the project by stages as proposed herein.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the investigation reported herein it is concluded that:

1. The existing channel of Silver Creek below its upper crossing of Silver Creek Road is inadequate to prevent flooding and damages to urban development now occurring in the flood plain of the creek.
2. Development of the area is being deterred by lack of sufficient flood control facilities.
3. The most economical solution to the flood control problem would be to construct a diversion channel consisting of about 6,900 feet of concrete lined channel, and 1,500 feet of earth channel including necessary structures for crossing existing roads. This diversion makes the required improvements on Lower Silver Creek much more economical. The existing channel of Silver Creek between the point of diversion and the crossing with King Road will be utilized for local drainage.
4. There is room in the open channel right-of-way for landscaping the channel if the City or County desires to undertake this work. The additional costs for the landscaping and the extra right-of-way needed were not included in the project cost.

5. The estimated construction cost including contingencies and rights-of-way is $871,000.

6. By appropriate staging of construction the project can be completed within the existing tax rate of the East Zone.

Based on these conclusions it is recommended that the flood control improvements on Silver Creek Diversion as proposed herein be approved and construction initiated as soon as possible.

Submitted by

John L. Richardson

John L. Richardson
Division Engineer

Recommended
Approval: W. M. Roman
W. M. Roman
Deputy Director of Engineering
Planning Branch

Approved: Lloyd C. Fowler
L. C. Fowler
Director of Engineering

MAP AND GENERAL PLAN

FOR

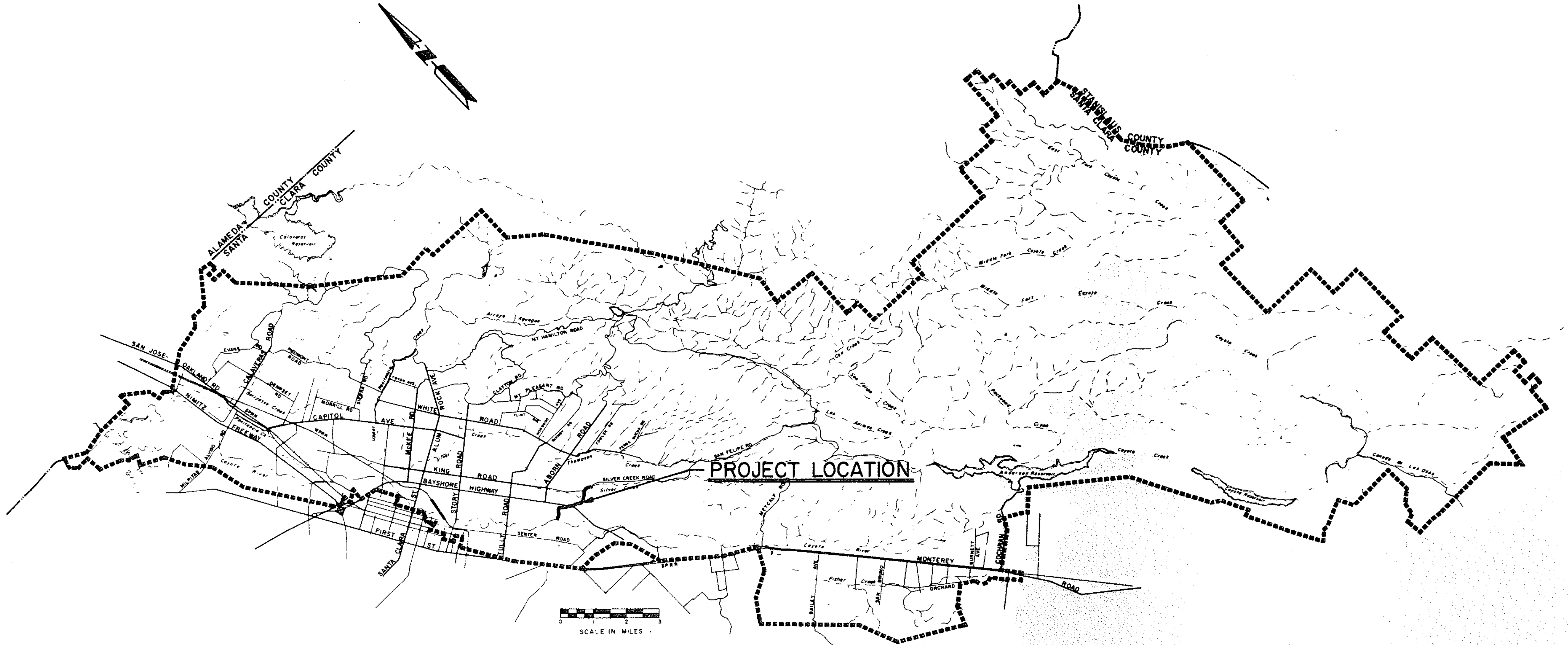
SILVER CREEK DIVERSION

FROM COYOTE CREEK TO FOOTHILLS

PROJECT NO. 40038 IN ZONE E-1 'EAST'

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

SANTA CLARA COUNTY, CALIFORNIA



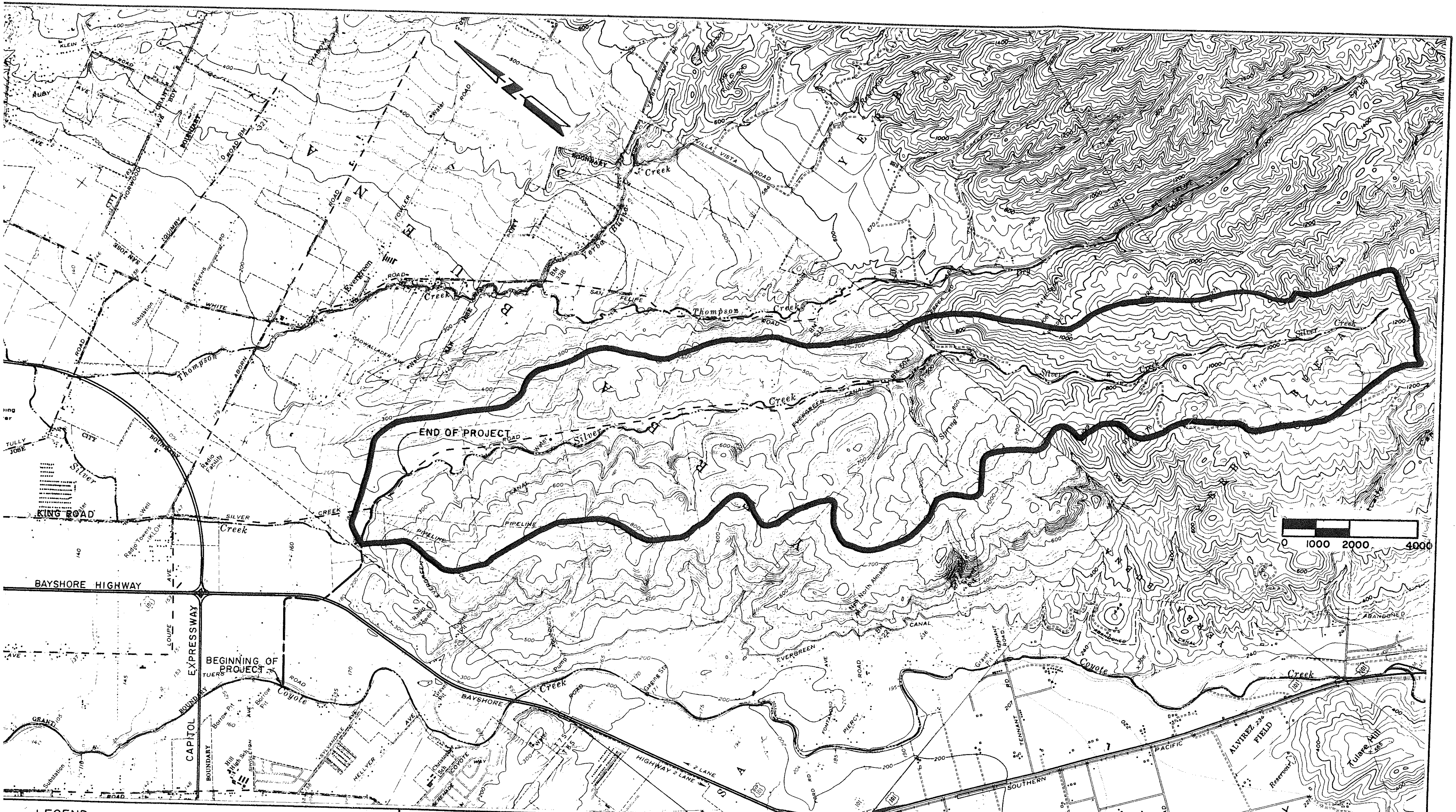
Project Approval:

Donald K Currlin

General Manager

Date: 10/15/69

PLATE I



LEGEND

- - - - -	PROJECT ROUTE
▬	WATERSHED BOUNDARY

SILVER CREEK
WATERSHED
ABOVE DIVERSION

TOTAL ACREAGE = 3590 ACS.

DATE	JULY 1969
DESIGN	J.L.R.
DRAWN	MH
CHECKED	J.L.R.

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

ENGINEERING APPROVAL

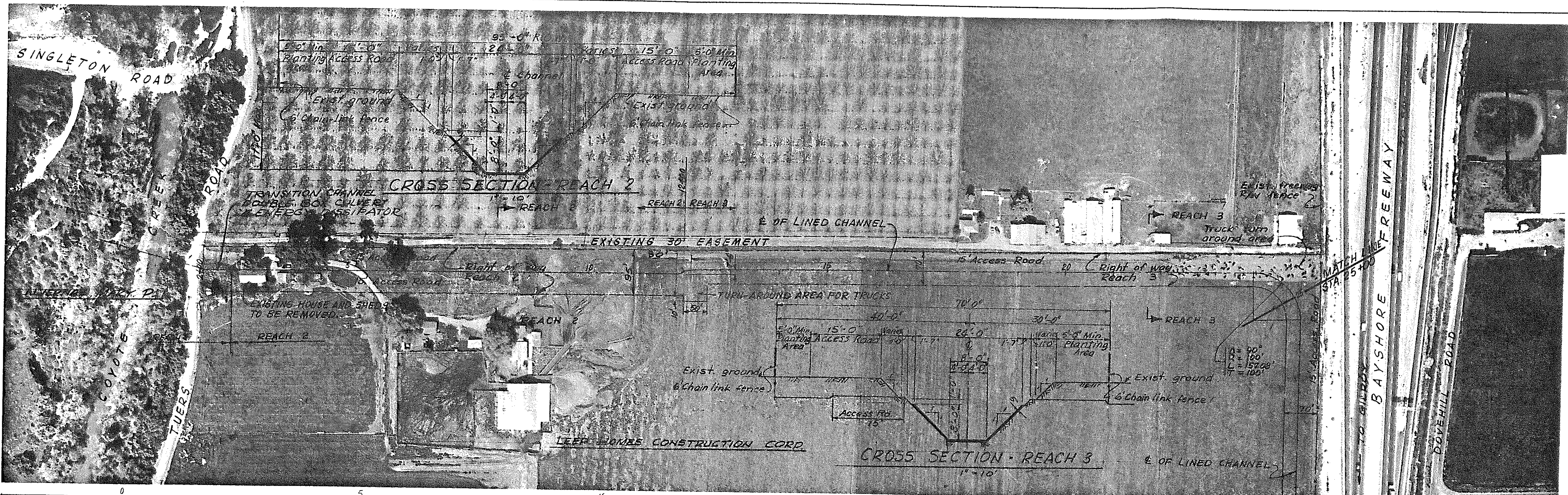
W. M. Reman
PROJECT COORDINATOR R.C.E. NO. 9649

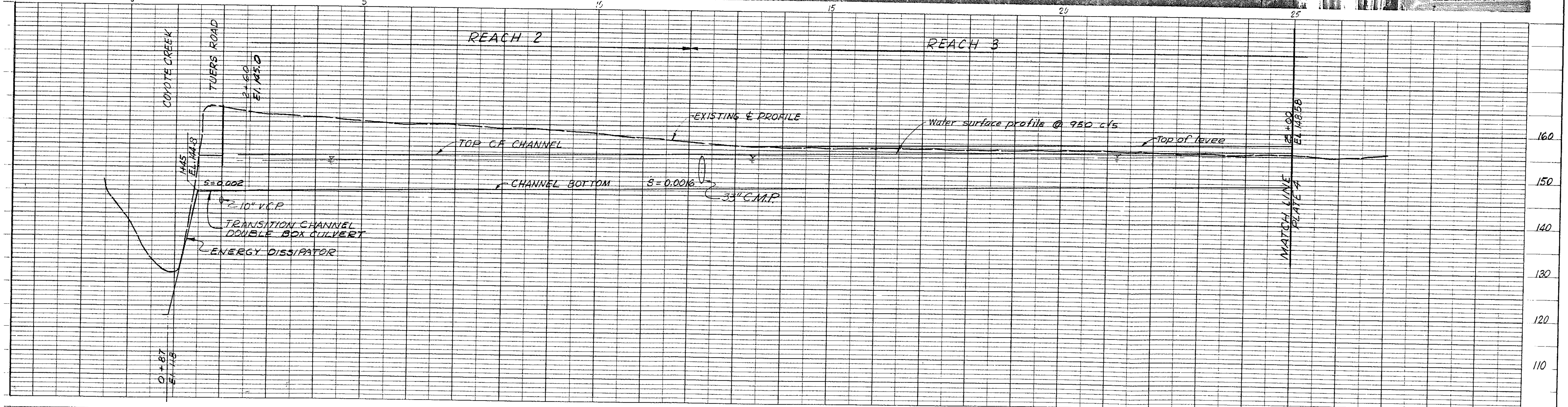
Lloyd C Fowler
DIRECTOR OF ENGINEERING R.C.E. No. 10822

MAP AND GENERAL PLANS
ZONE E-1 (EAST) PROJECT 40038
SILVER CREEK DIVERSION

SCALE
AS SHOWN

PLATE
2





REFER TO TRACING FOR LATEST REVISION

DESCRIPTION	SUB	APPR

NOTES

DATE OF PHOTOGRAPHY 3-27-67

DATE 9/30/69	**santa clara county** FLOOD CONTROL and WATER DISTRICT
DESIGN H.C.O.	DESIGNED AND DRAWN BY: CHARLES S. McCANDLESS & COMPANY
DRAWN B. West	ENGINEERING APPROVAL PROJECT ENGINEER
CHECKED S.D.R.	PROJECT COORDINATOR R.C.E. No. 9449

ACCEPTED BY DISTRICT

Lloyd C. Fowler

DIRECTOR OF ENGINEERING R.C.E. No. 10822

MAP AND GENERAL PLANS

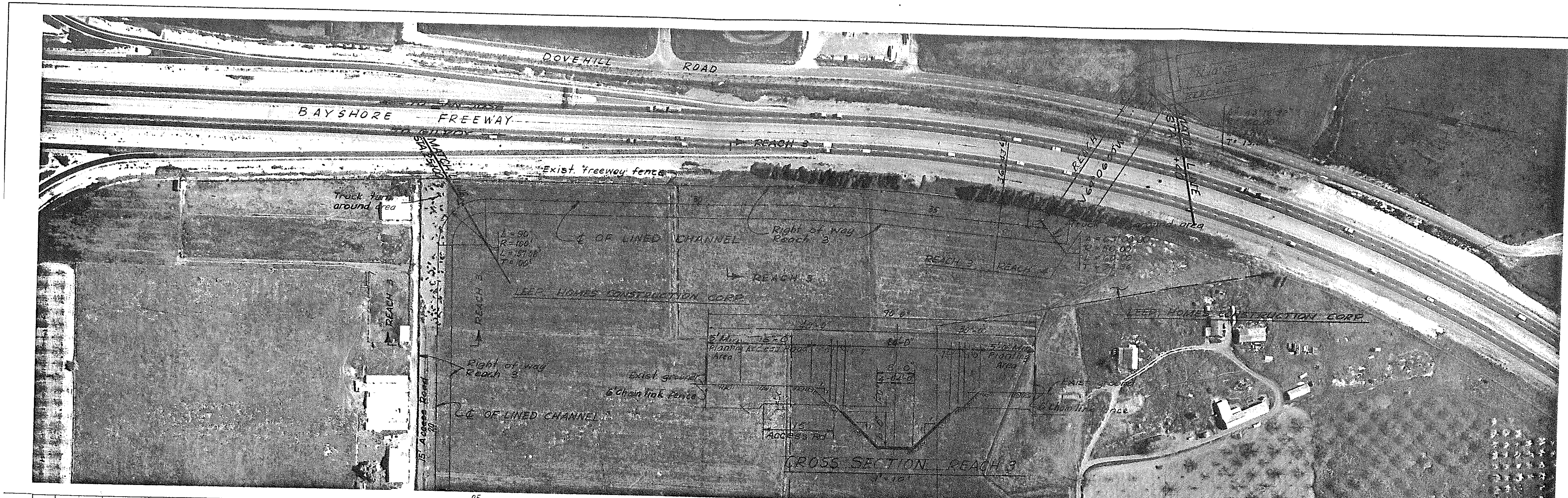
ZONE E-1

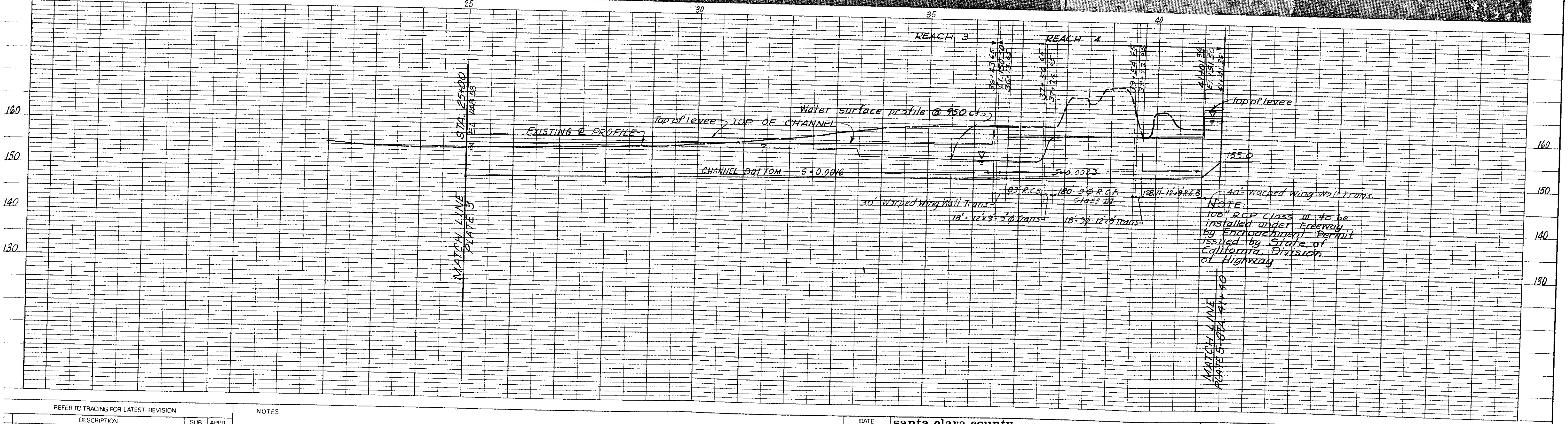
SILVER CREEK DIVERSION

STATIONS 0+87 TO 25+00

SCALE 1" = 100'

PLATE NO. 3





NOTE:
108" RCP Class III to be installed under Freeway by Encroachment Permit issued by State of California, Division of Highway

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DESCRIPTION	SUB	APPR

NOTES

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DATE 9/30/69
DESIGN M. Liu
DRAWN H. West
CHECKED A.D.A.

santa clara county
FLOOD CONTROL and WATER DISTRICT
DESIGNED AND DRAWN BY:
CHARLES S. McCANDLESS & COMPANY

ENGINEERING APPROVAL
PROJECT ENGINEER R.C.E. 7845
W. M. Inman
PROJECT COORDINATOR R.C.E. NO. 9649

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DIRECTOR OF ENGINEERING R.C.E. No. 10822

MAP AND GENERAL PLANS

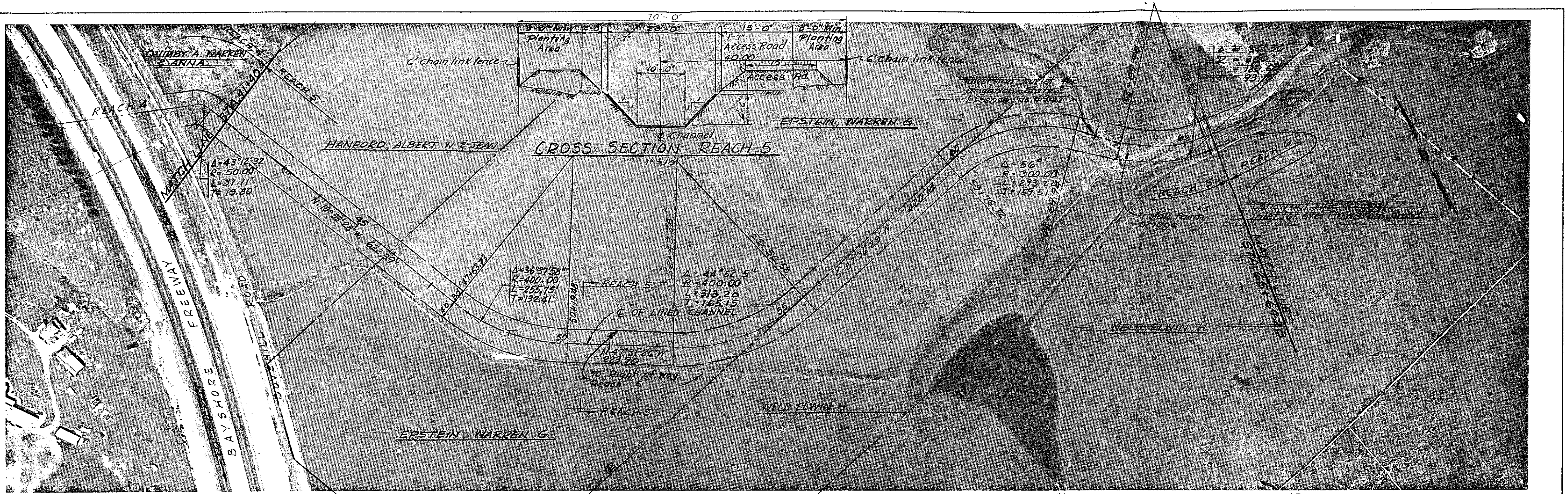
ZONE E-1

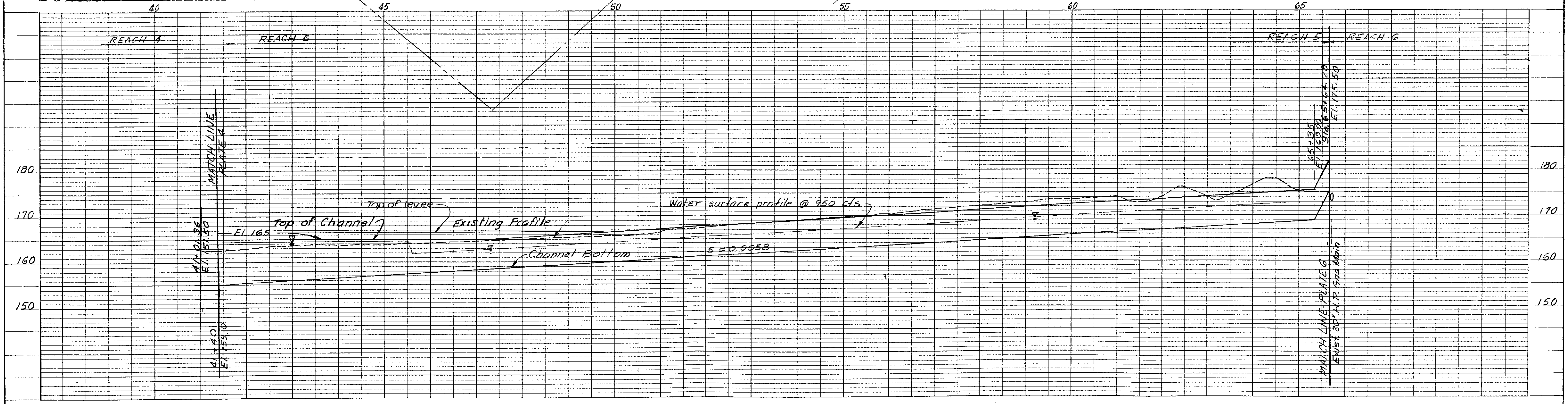
SILVER CREEK DIVERSION

STATIONS 25+00 TO 41+01

SCALE
1" = 100'

PLATE NO.
4





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REV	DESCRIPTION	SUB	APPR

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6500 x 168/27

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CHECKED A.D.R.

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY:
CHARLES S. McCANDLESS & COMPANY

ENGINEERING APPROVAL
PROJECT ENGINEER R.C.E. 17845
N. M. Orman
PROJECT COORDINATOR R.C.E. NO. 9649

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DIRECTOR OF ENGINEERING R.C.E. No. 10822

MAP AND GENERAL PLANS

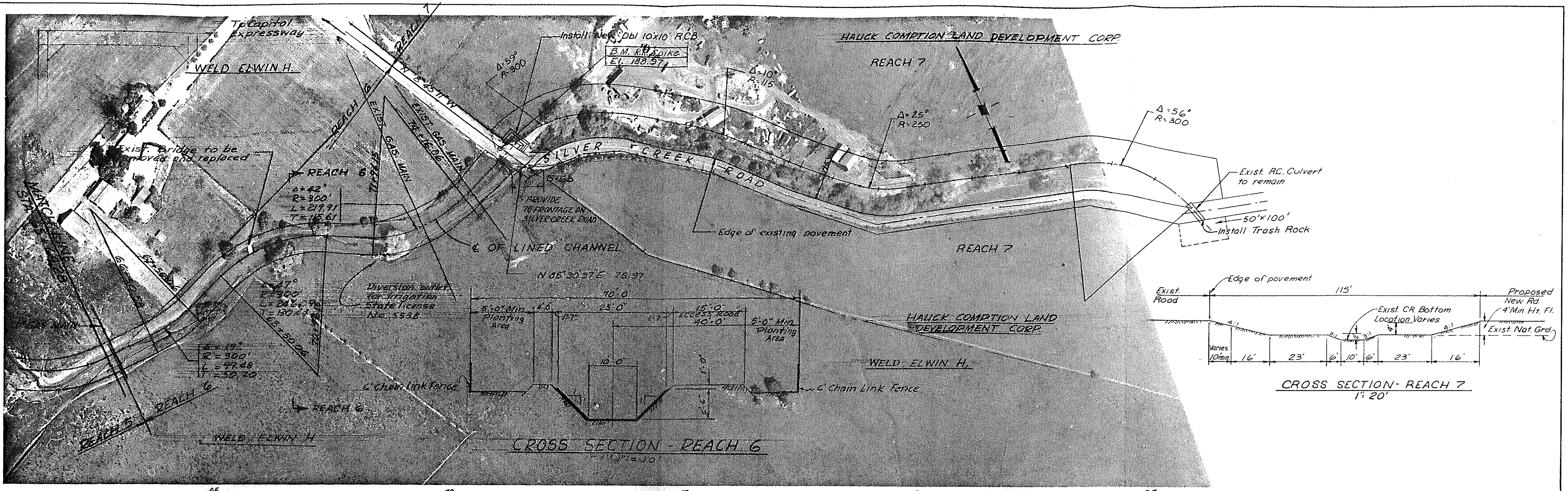
ZONE E-1

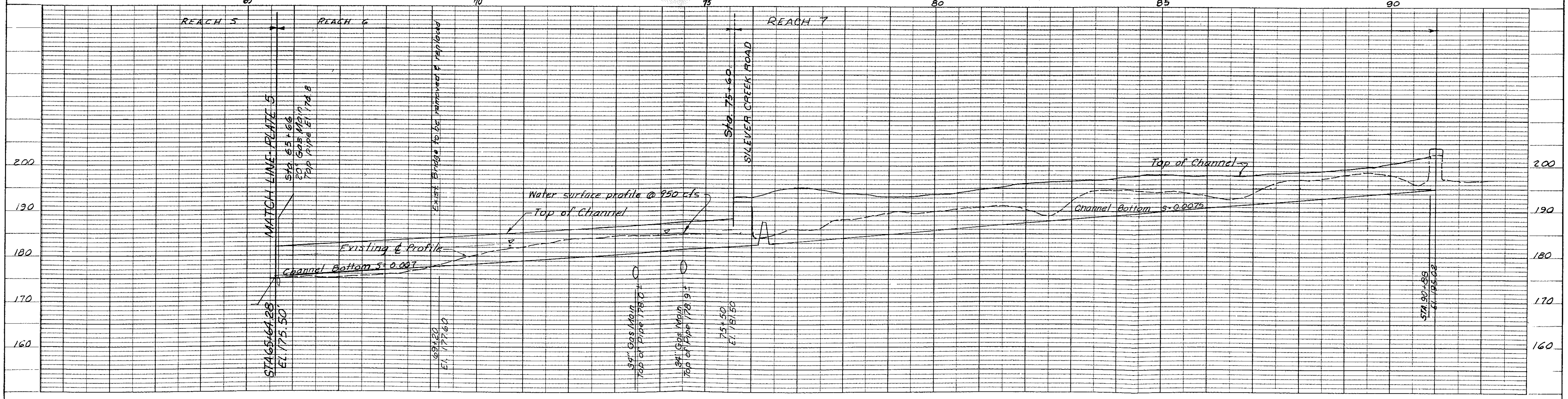
SILVER CREEK DIVERSION

STATIONS 41+01 TO 65+64

SCALE 1" = 100'

PLATE NO. 5





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REV	DESCRIPTION	SUB	APPR

NOTES

DATE OF PHOTOGRAPHY 3-27-67

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DRAWN H. West
CHECKED A.D.R.

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY:
CHARLES S. McCANDLESS & COMPANY

ENGINEERING APPROVAL
David Korbholtz RCE 17845
PROJECT ENGINEER
M. M. Roman
PROJECT COORDINATOR R.C.E. NO. 9649

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DIRECTOR OF ENGINEERING R.C.E. No. 10822

MAP AND GENERAL PLANS

ZONE E-1

SILVER CREEK DIVERSION

STATIONS 65+64 TO 90+88

SCALE 1" = 100'

PLATE NO. 6